$PM_{2.5}$ Designation Recommendation for Harris County

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Texas Commission on Environmental Quality

Agenda

- EPA's Designation Request
- Fine Particulate Matter ($PM_{2.5}$) Background
- Monitoring Data and Trends
- Local Efforts to Reduce Particulate Matter
- Designation Recommendation Considerations
- Comments/Questions

EPA's Designation Request

EPA's Designation Request

On October 8, 2009, the governor received a letter from the EPA requesting a designation recommendation within 120 days. The EPA initiated the redesignation process based on 2006-2008 monitoring data, which indicates one monitor in Harris County may be violating the annual $PM_{2.5}$ NAAQS of 15.0 micrograms per cubic meter ($\mu g/m^3$).

120 Day Timeline

October 8, 2009	Governor received letter from the EPA
October 29, 2009	TCEQ Commissioner Work Session
October 30, 2009 – November 23, 2009	Informal comment period
November 19, 2009	TCEQ hosted informational meeting
December 4, 2009	TCEQ Commissioner Work Session
January 5, 2010	TCEQ to submit designation recommendation to governor
February 5, 2010	120 day deadline to submit recommendation to the EPA

Fine Particulate Matter ($PM_{2.5}$) Background Information

Fine Particulate Matter ($PM_{2.5}$) – Background Information

- $PM_{2.5}$ describes particulate matter that is 2.5 micrometers in diameter and smaller - 1/30th the diameter of a human hair.

- $PM_{2.5}$ is a mixture of microscopic solid and liquid particles suspended in air.

- $PM_{2.5}$ is made up of a number of components, including ammonium sulfate, organic carbonaceous material, ammonium nitrate, black carbonaceous material (soot), soil dust particles, and allergens (such as fragments of pollen or mold spores).

Fine Particulate Matter ($PM_{2.5}$) – Background Information

- Exposure
  - Inhalation
- Health Effects
  - Reduced lung function
  - Chronic bronchitis
- People with heart disease are especially susceptible to the negative effects of $PM_{2.5}$.

Fine Particulate Matter ($PM_{2.5}$) – Background Information

- Annual average standard = 15.0 µg/m^3

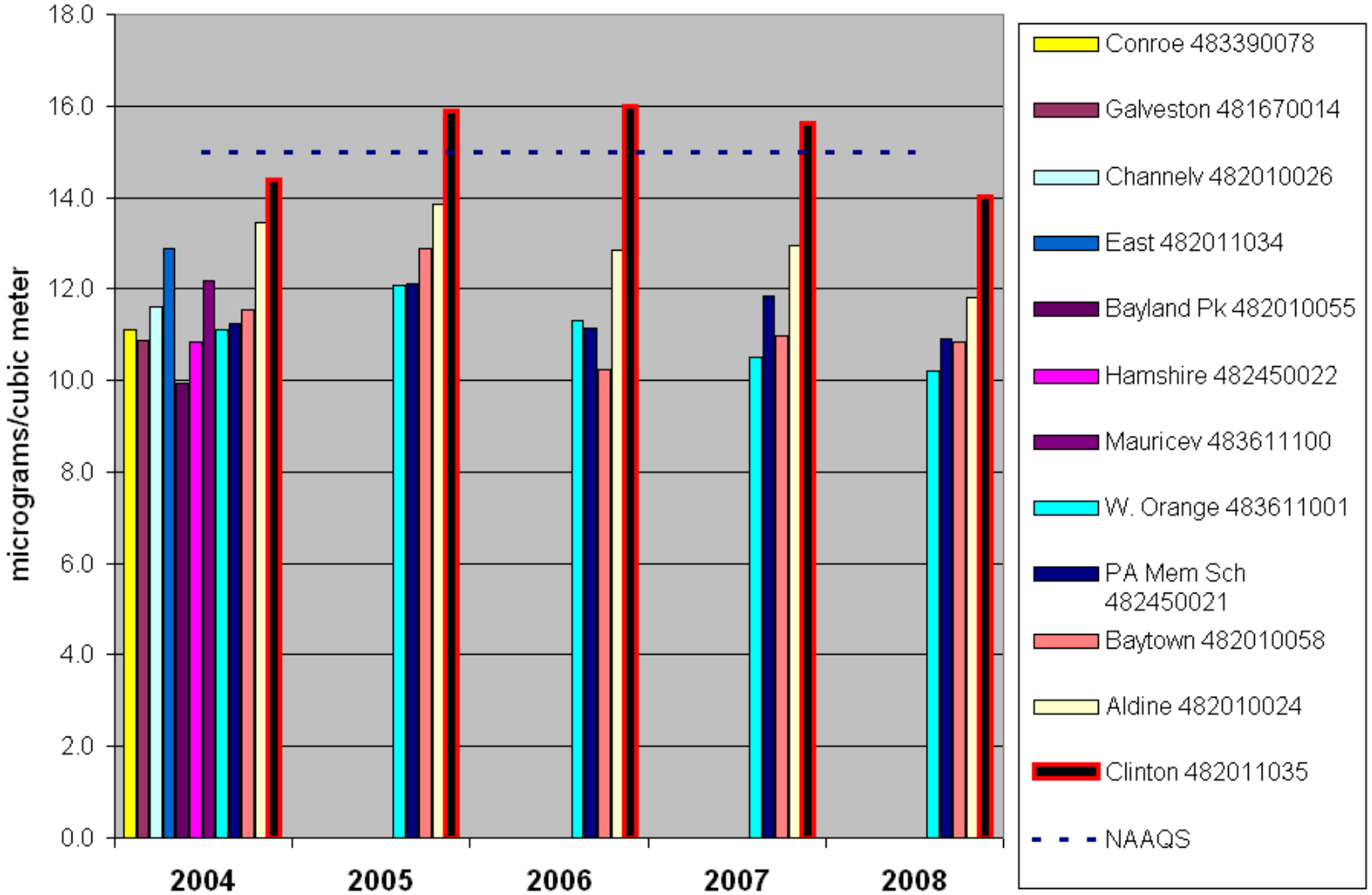
  To attain this standard, the 3-year average of the weighted annual mean $PM_{2.5}$ concentrations from single or multiple community-oriented monitors must not exceed 15.0 micrograms per cubic meter (µg/m^3).

- The entire state of Texas is currently designated as "Unclassifiable/Attainment" for the annual average $PM_{2.5}$ standard. The EPA issued these designations on January 5, 2005, (70 FR 943).

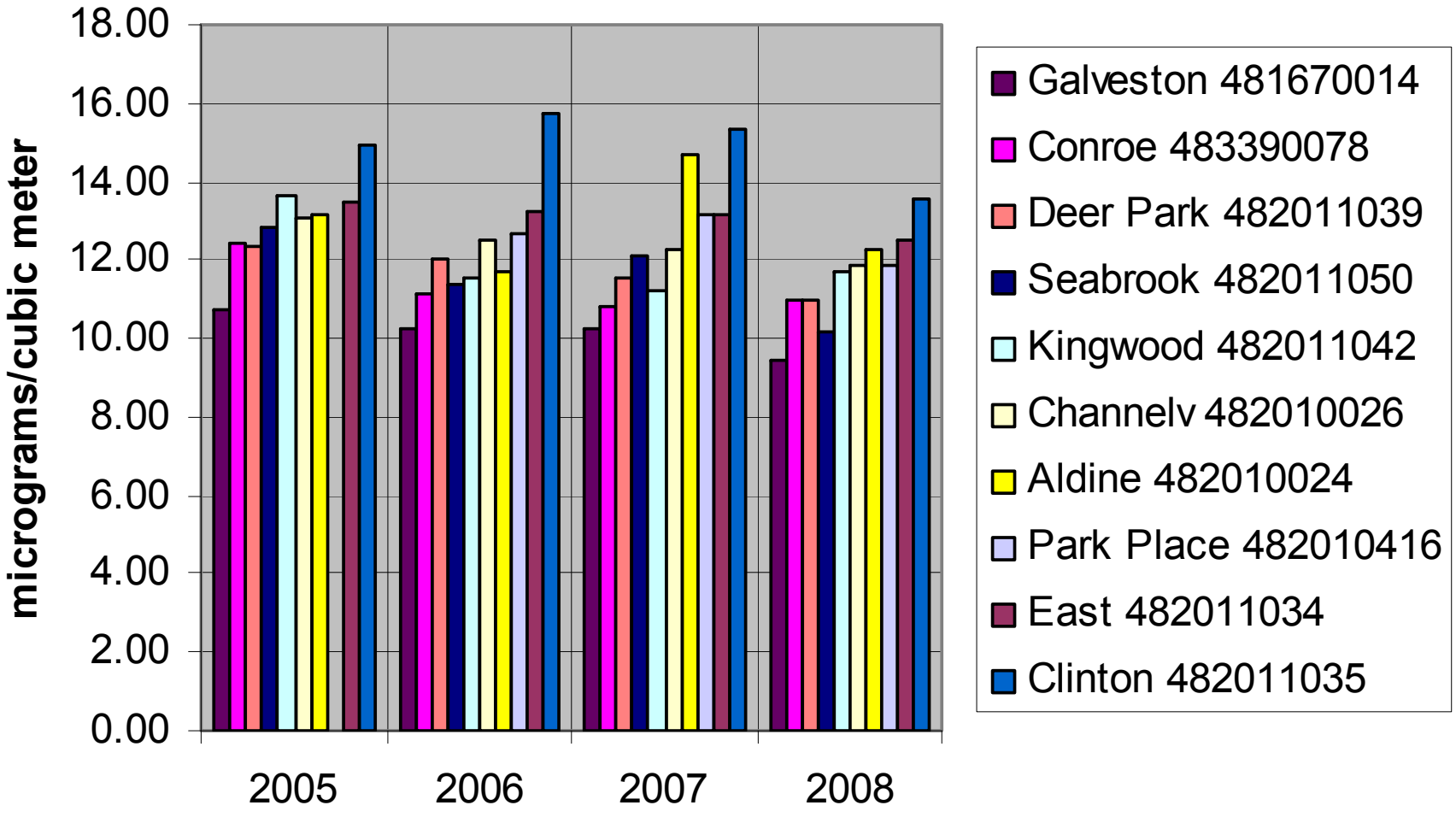
Source: http://www.epa.gov/air/criteria/html

Monitoring Data and Trends

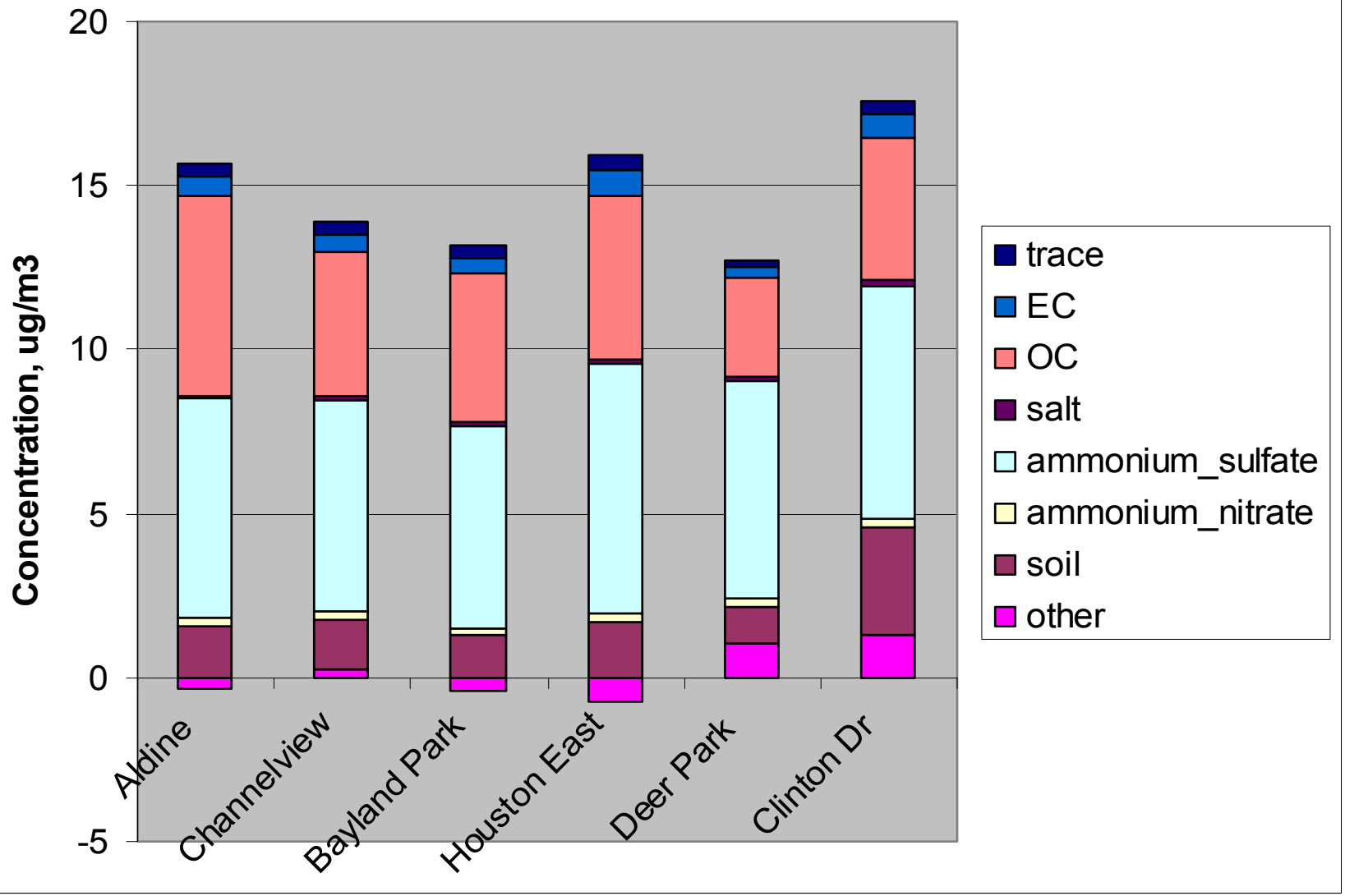
$PM_{2.5}$ Annual Means, 2004-2008, All Regulatory Monitors in the Upper Texas Coast (Exceptional Event Data Included)



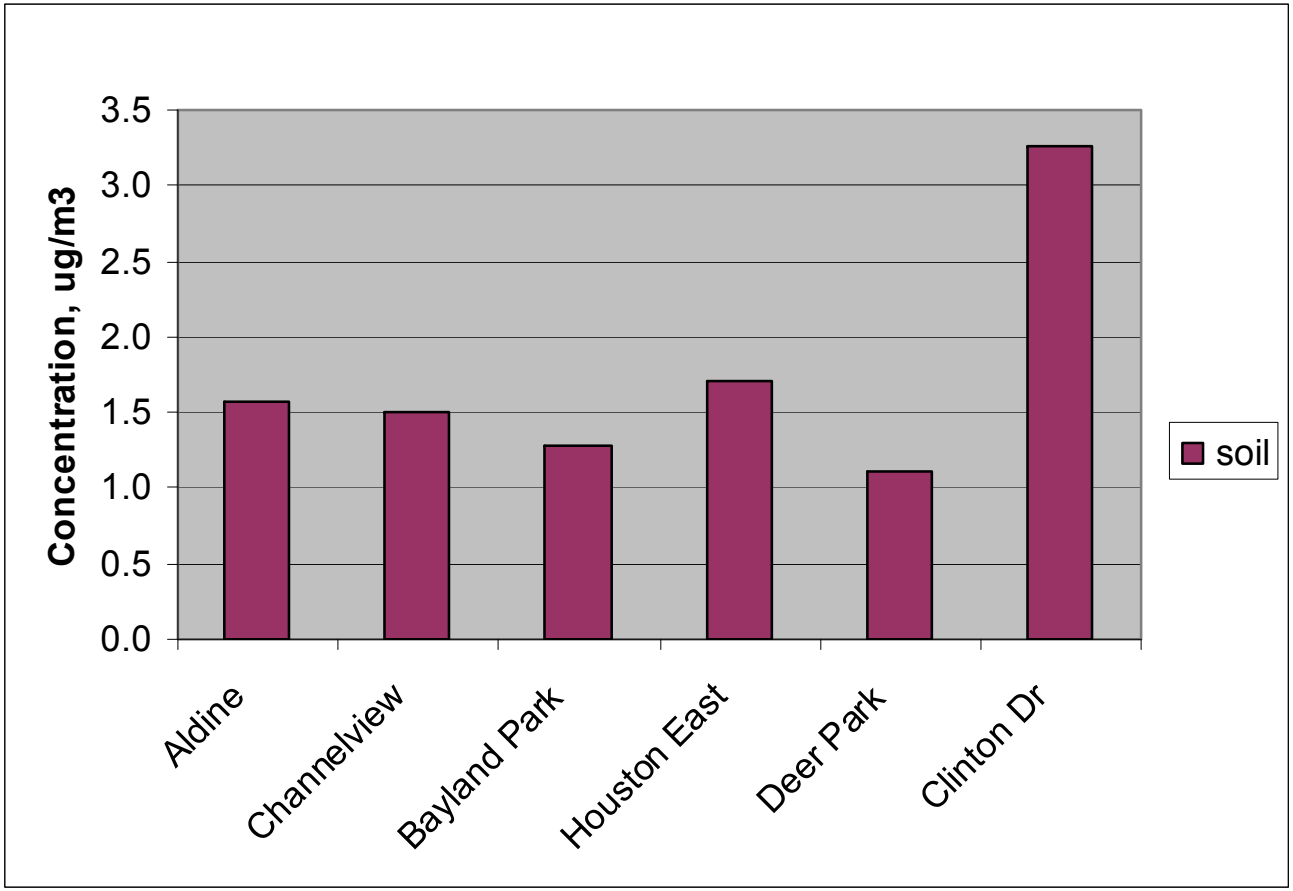
TEOM $PM_{2.5}$ Annual Means Houston Region 2005-2008



Chemical Speciation Analysis Results



Mean Reconstructed Soil Component at Clinton, Summer 2006, Compared to Other Sites from Summer 2005



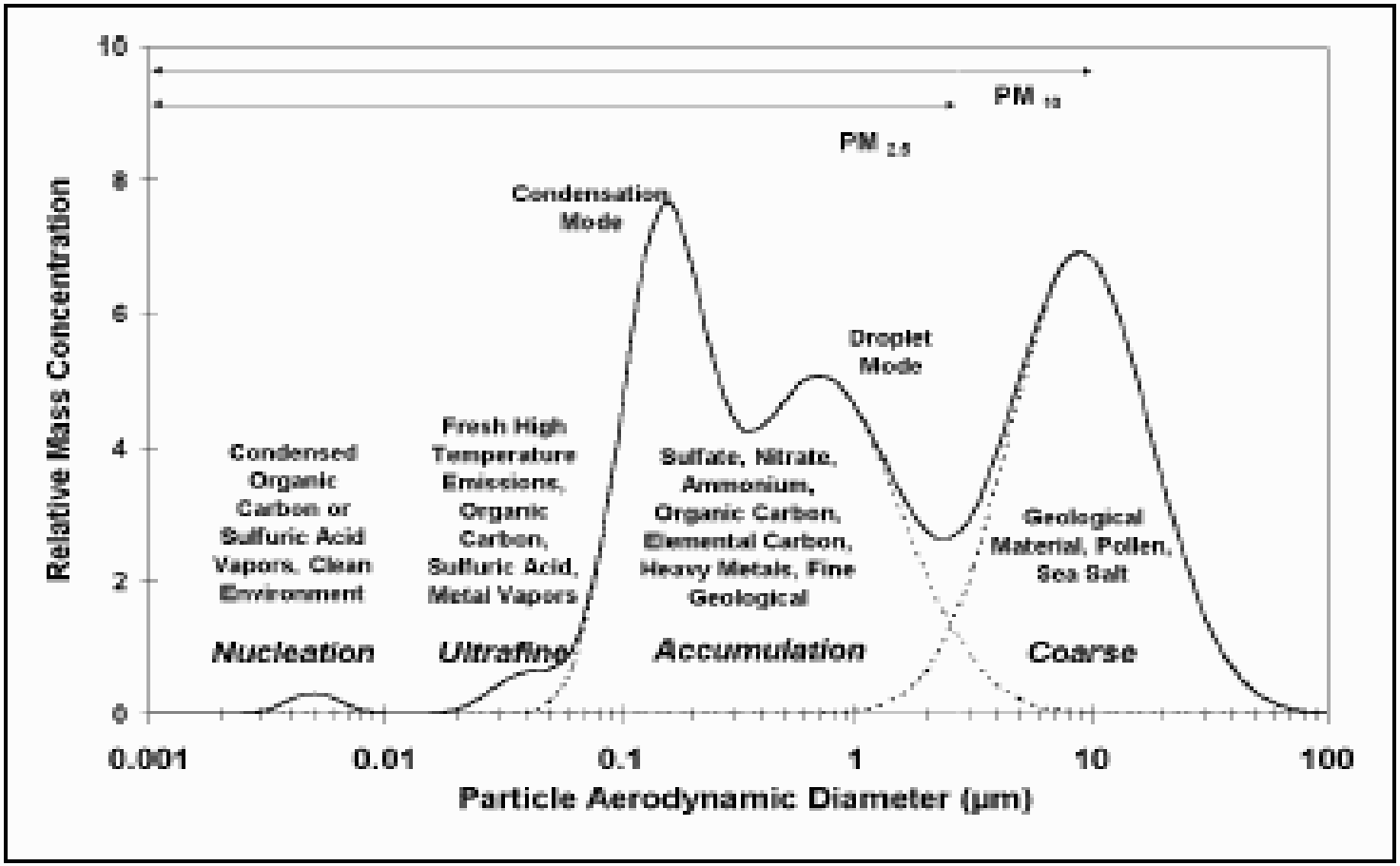
Data Analysis Results for the Clinton Monitor

After removing African dust transport days, two contributing local dust components were identified:

- Fine soil (dust) $PM_{2.5}$ from the SSE-through-SSW.
  - This “soil/crustal material” contains silicon, aluminum, titanium, and iron.
- Calcium and calcium sulfate from the SSE through the WNW.
  - Soil containing calcium and calcium sulfate contributes more $PM_{2.5}$ mass than the “soil/crustal material” source factor does.

Clinton Dr. Area

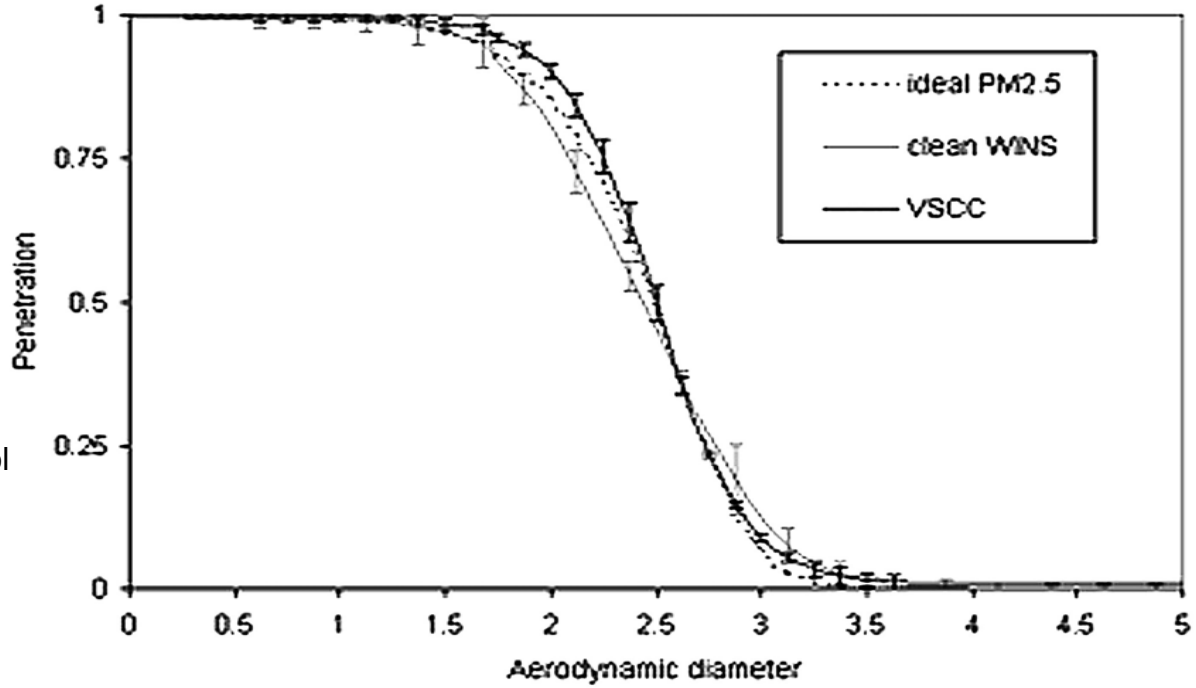
Dust and Soil Particles Are Generally Larger Than $PM_{2.5}$



Watson, J. G., "Visibility: Science and Regulation," J. Air & Waste Manage. Assoc. 52 (2002) 628–713

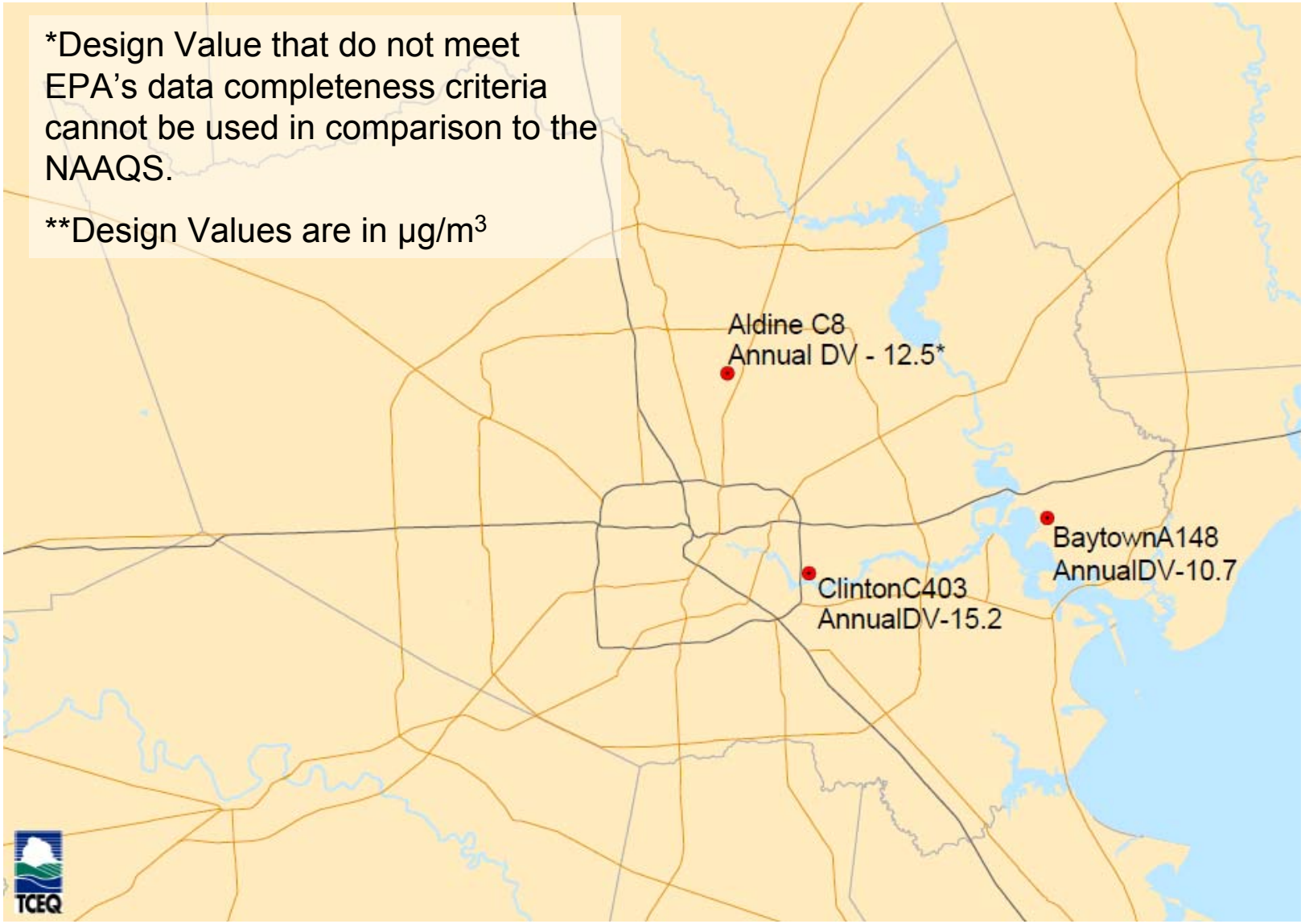
Clinton Drive $PM_{2.5}$ Measurements Include Large Amounts of Coarse Particulates

- Clinton Drive filters contain soil and dust particles.
- Electron microscopy shows a significant portion of the sample weight from coarse particulates.
- Not surprising based on sampler design and significantly impacts measurements and health implications.



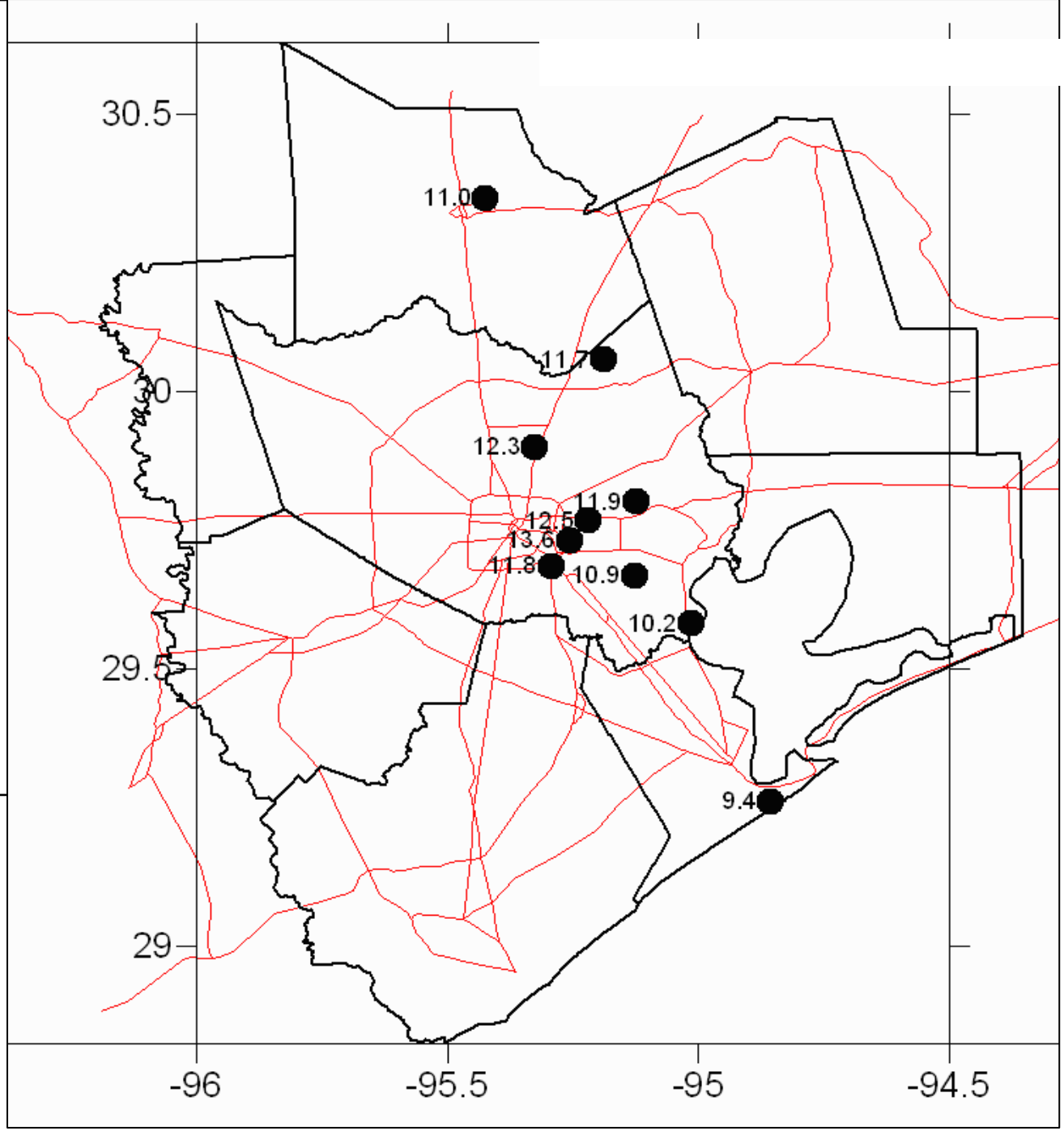
Kenny, L. C., Merrifield, T., Mark, D., Gussman, R. and Thorpe, A.(2004) 'The Development and Designation Testing of a New USEPA-Approved Fine Particle Inlet: A Study of the USEPA Designation Process', Aerosol Science and Technology, 38: 12, 15-22

2008 Annual $PM_{2.5}$ Design Values in Harris County Including Exceptional Events

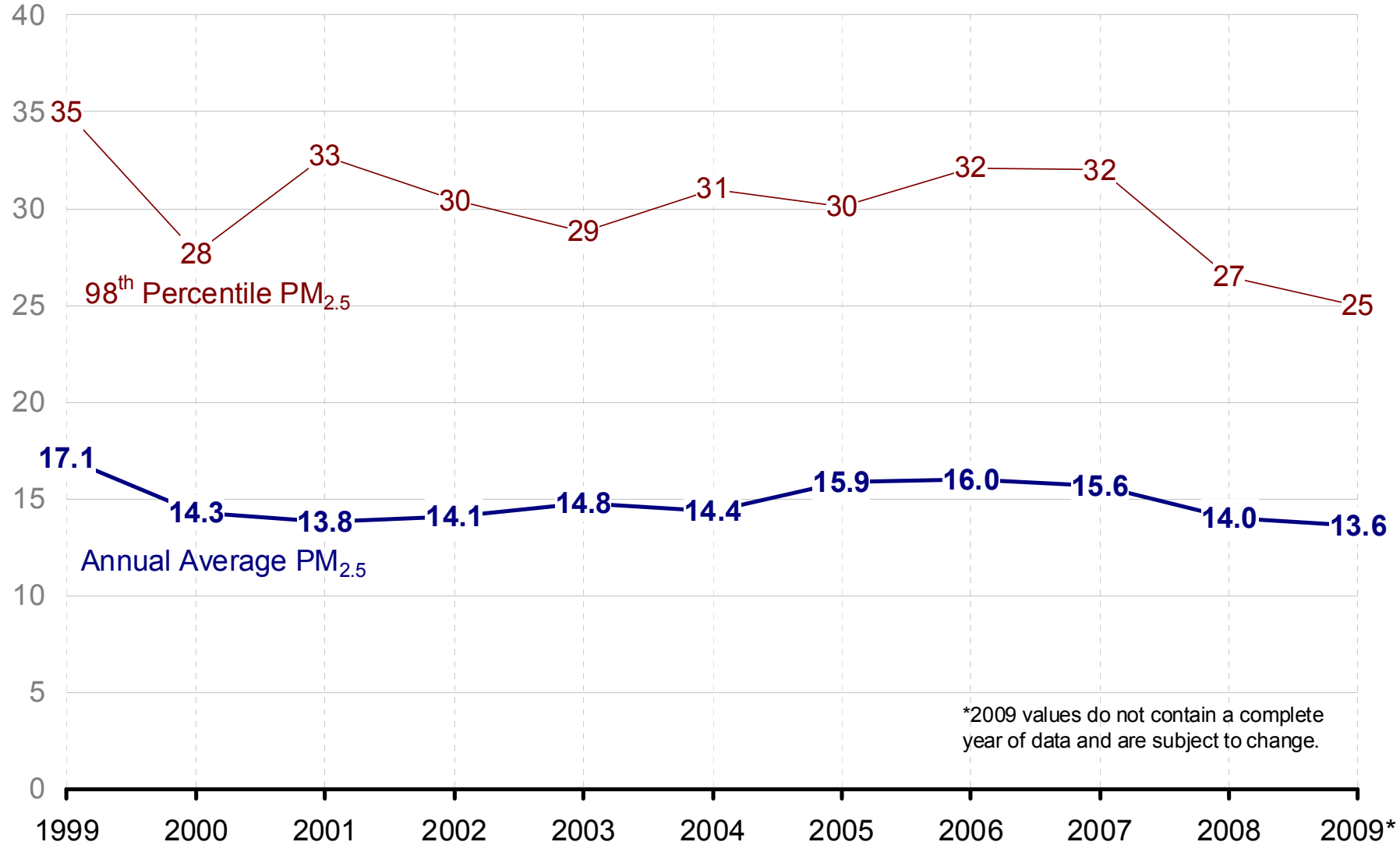


2008 $PM_{2.5}$ Annual Averages at TEOM Monitors in the HGB Region

These monitors show the distribution of $PM_{2.5}$ levels, but they are not official for comparison to the NAAQS.



Annual Average and 98th Percentile $PM_{2.5}$ at the Clinton Drive Monitor Including Exceptional Events



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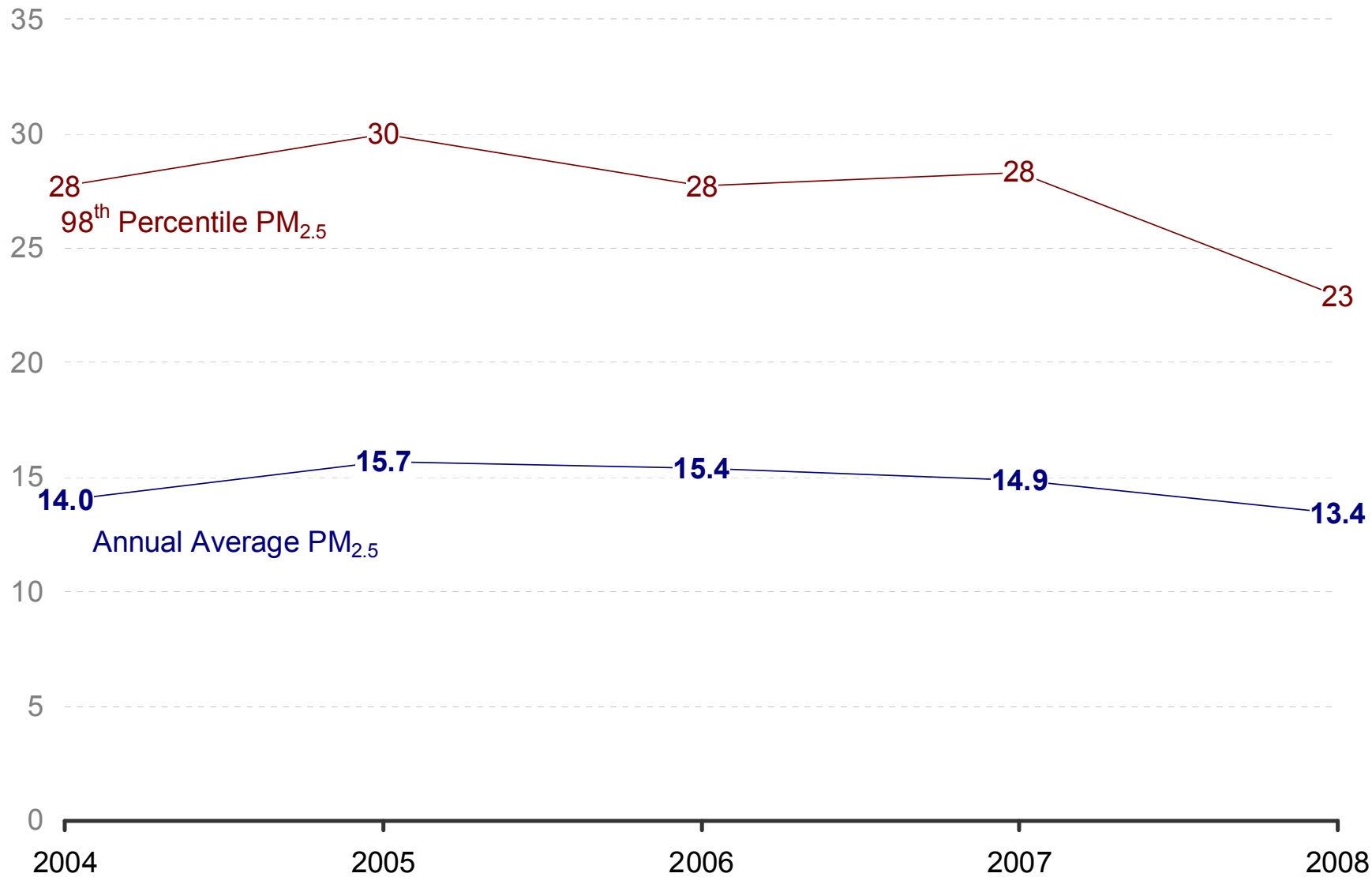

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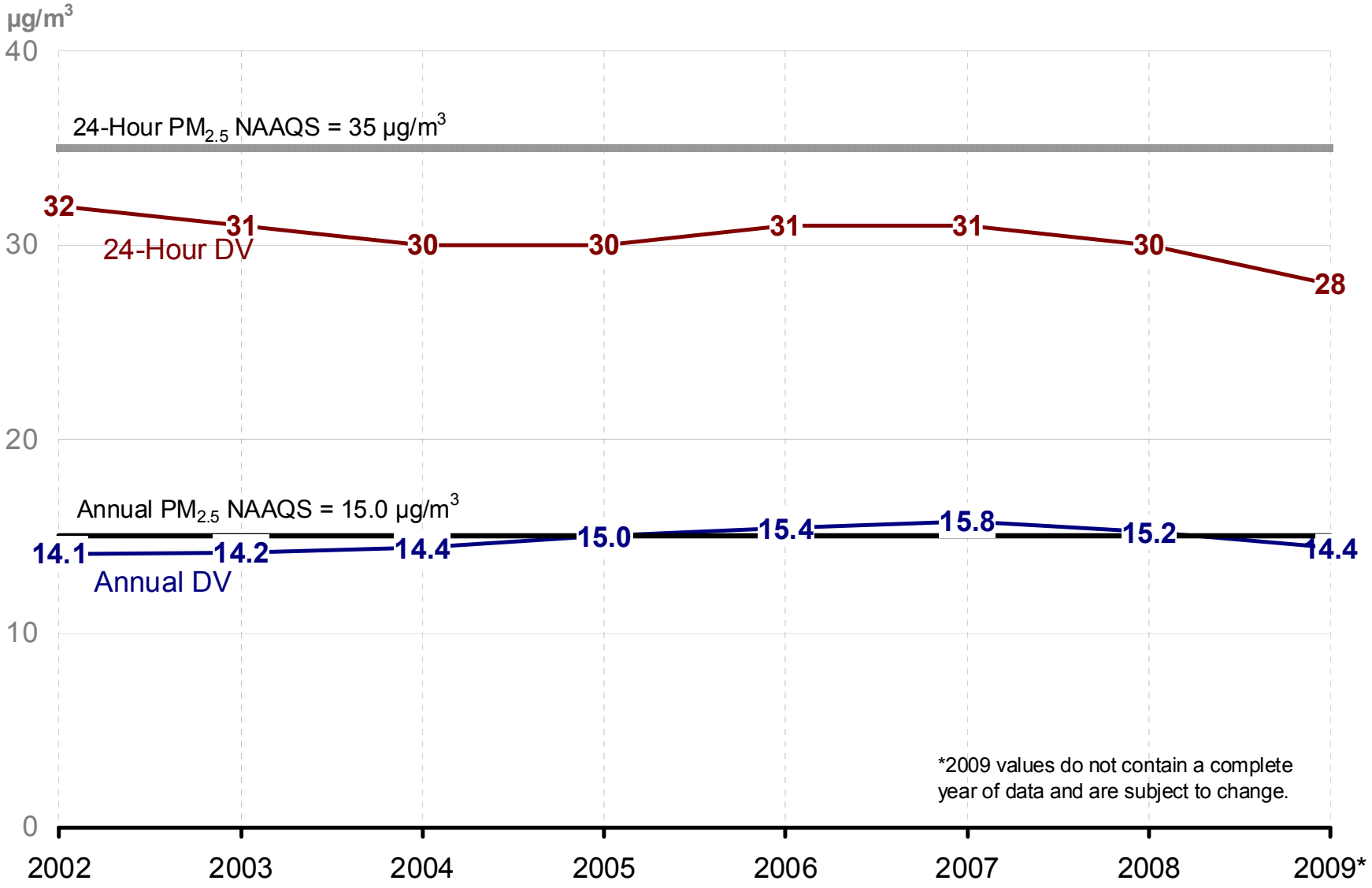
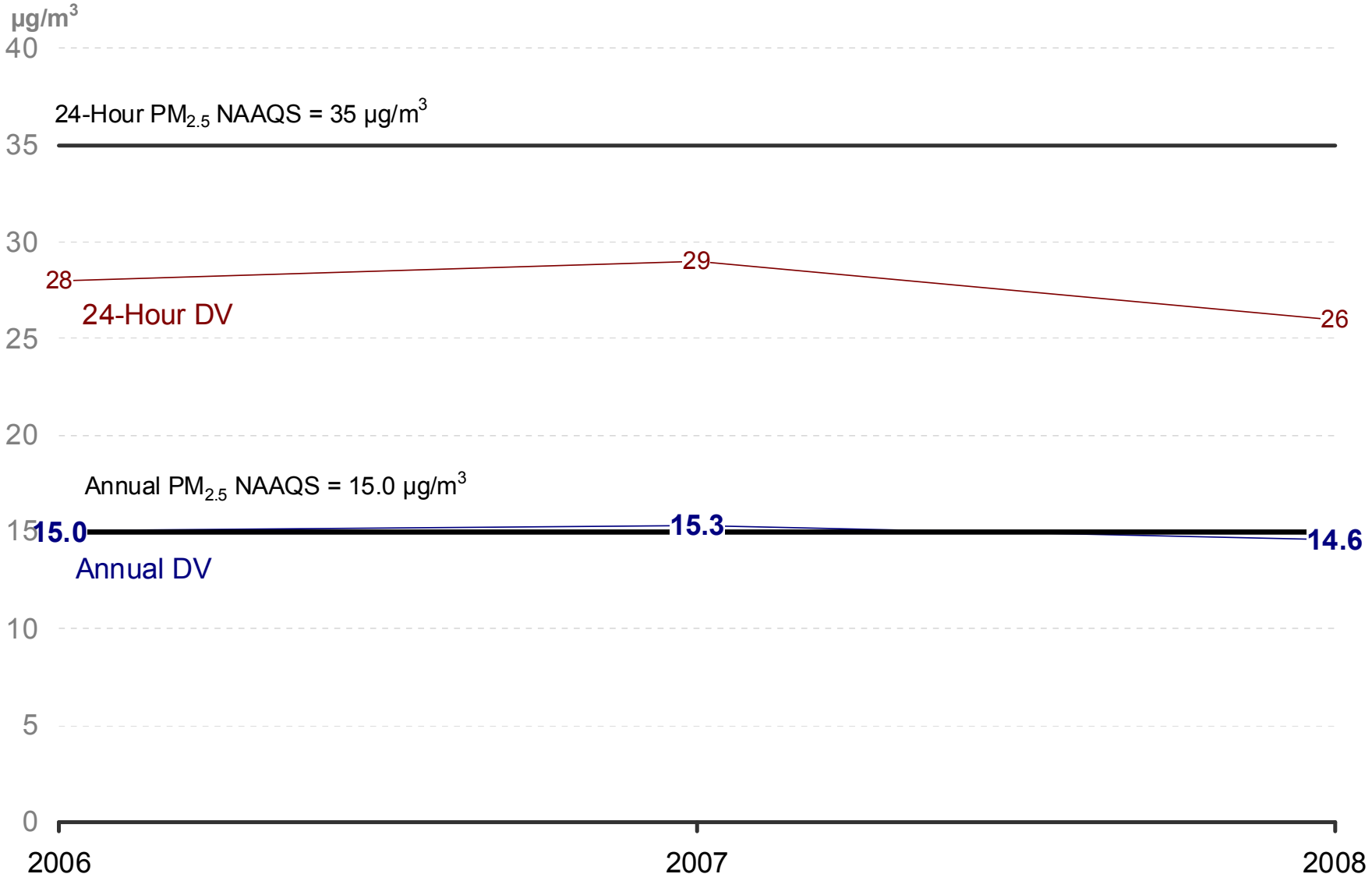


$PM_{2.5}$ Design Values at Clinton Drive Excluding Exceptional Events

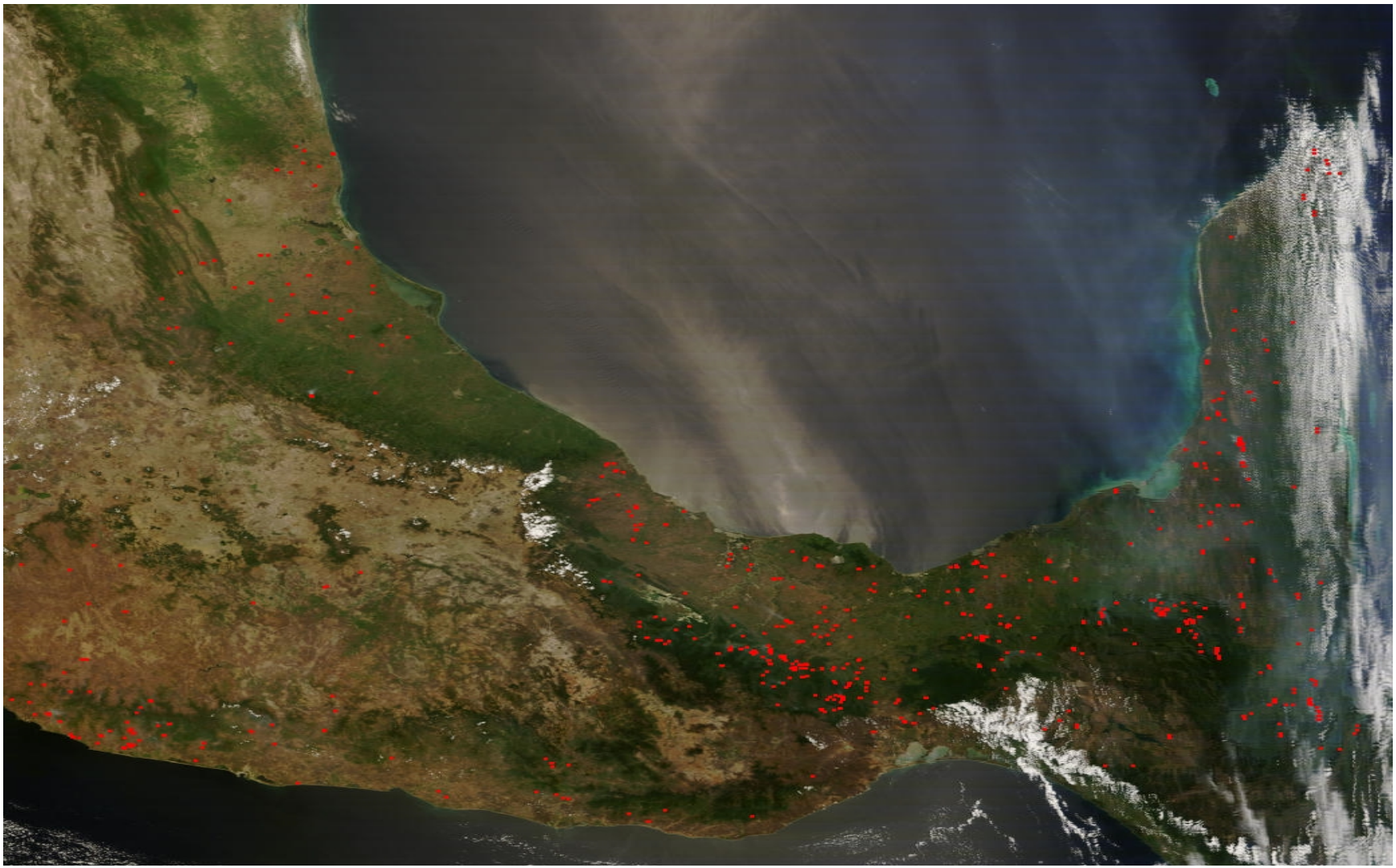


Exceptional Event Days

- EPA guidance allows for the removal of “exceptional event days” from data sets.

- EPA defines “exceptional events” as events that:
  - Affect air quality
  - Are not reasonably controllable or preventable
  - Are caused by human activity unlikely to recur or a natural event
  - are determined through the process established in the regulations, 40 CFR Part 50.14

Smoke from Agricultural Fires in Mexico Satellite Image May 23, 2008

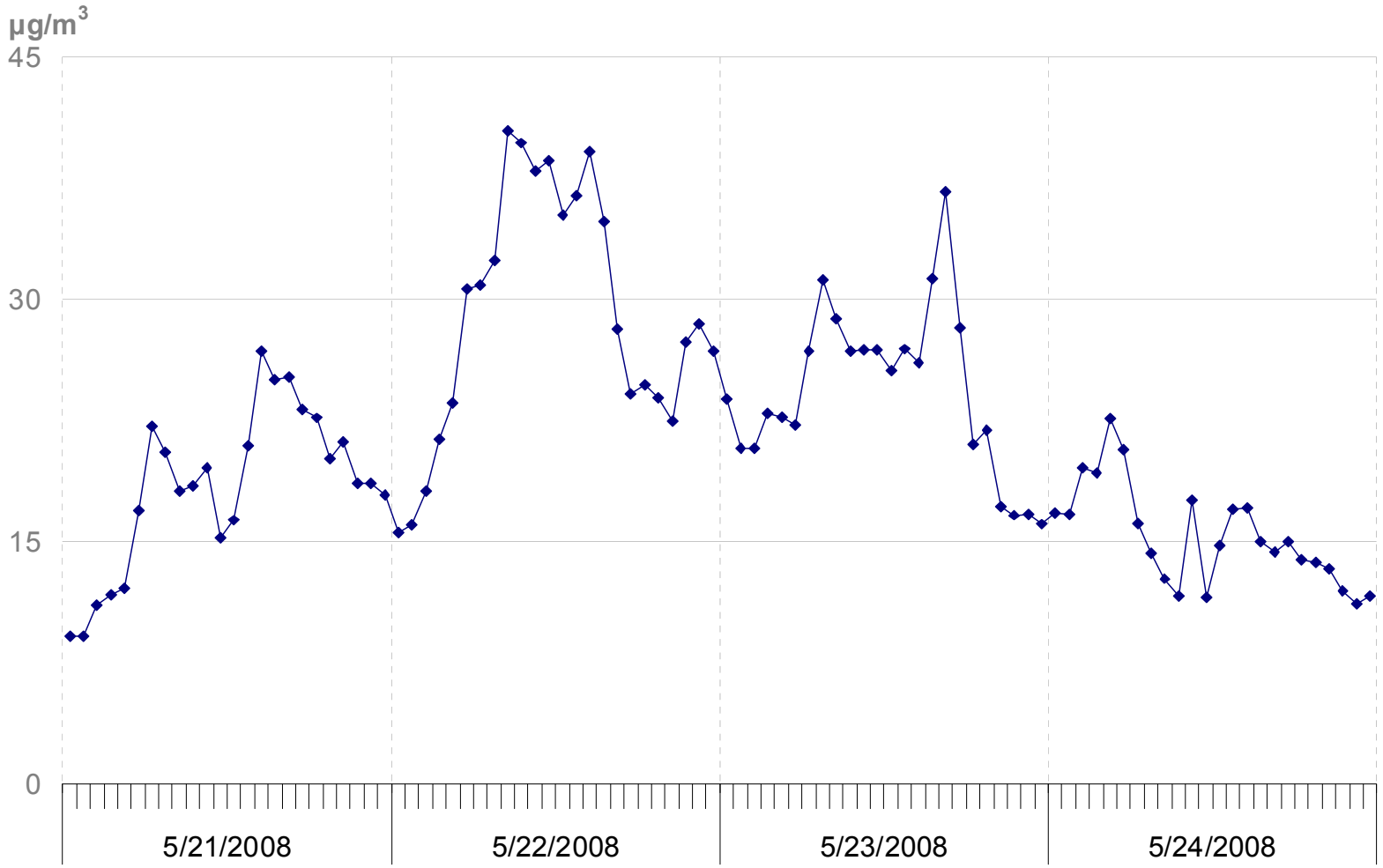


Smoke from Agricultural Fires in Mexico Satellite Image May 23, 2008

- Video insert of Animation for May 23, 2008: http://www.tceq.state.tx.us/assets/public/compliance/monops/air/sigevents/08/080523ani-gulf.html

- May 21-25 smoke event description http://www.tceq.state.tx.us/assets/public/compliance/monops/air/sigevents/08/event2008-05-21tx.html

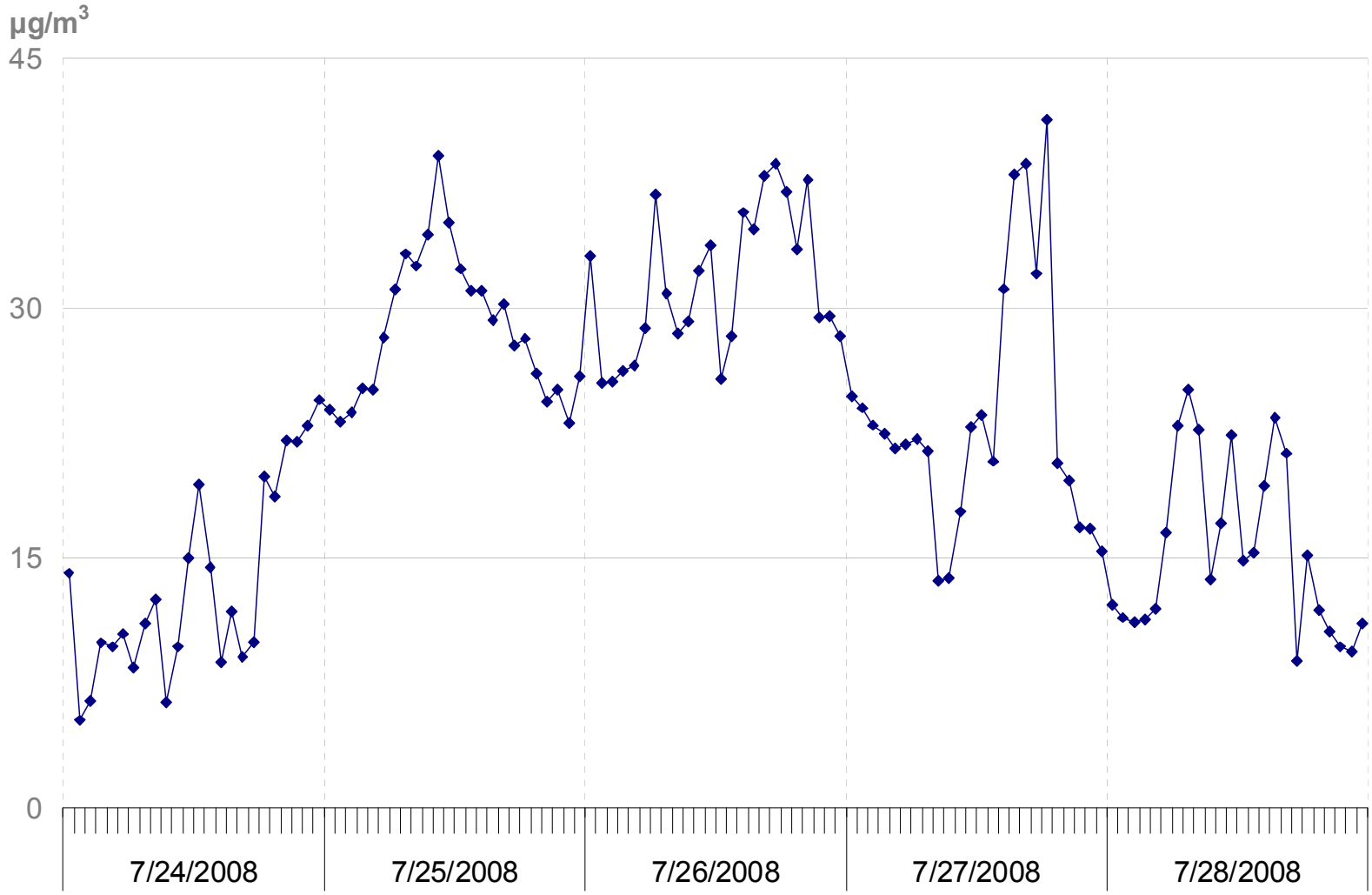
Hourly $PM_{2.5}$ Concentrations at Clinton May 21-24, 2008



Saharan Dust Transport Across the Atlantic Satellite Image July 25-27, 2008

ppt insert of July 24-28 event 2008 :
http://www.tceq.state.tx.us/assets/public/compliance/monops/air/sigevents/08/event2008-07-25tx.html

Hourly $PM_{2.5}$ Concentrations at Clinton
July 24-28, 2008



Local Efforts to Reduce Particulate Matter in the Clinton Drive Area

Efforts to Reduce $PM_{2.5}$ in the Clinton Drive Area

Efforts have included working with:

- EPA Region 6
- The City of Houston
- Harris County Commissioners
- Port of Houston Authority
- Port Terminal Rail Authority
- Local industry

Supplemental Environmental Project (SEP)

- TCEQ commissioners approved a SEP to pave the parking lot directly adjacent to the monitoring station.
- Construction was completed mid-2009.

City of Houston

- Installed barriers to keep trucks from driving onto the unpaved shoulder.
- Installed a traffic light at Clinton Drive and the Industrial Park East gate to control traffic at the intersection and completed a landscaping project along Clinton Drive.

Union Pacific (UP)

- UP reports that the current Tier locomotives used along Clinton Drive collectively emit 4.8 tpy PM less than unregulated engines.
- UP currently has 52 new gensets in the Houston area.
- 13 locomotives are being funded by Texas Emissions Reduction Plan (TERP).
- 60% of UP switcher engines have anti-idling control.

Port Transit Rail Authority (PTRA)

- PTRA will be operating newly-refurbished switcher engines on the Clinton line. These newly-refurbished 1996 engines were recently classified as Tier 0.
- PTRA has stopped the steel loading activities on a dirt area to the south of the monitor.

Port of Houston Authority (Port)

- PHA along with eight other Houston Ship Channel industries are the recipients of $3.4 million in an EPA National Clean Diesel Campaign that provides funding through the Diesel Emission Reduction Act (DERA), which will reduce port related diesel emissions.
- All new leases with the Port will include enhanced dust suppression requirements.
- The Port reports widespread use of emulsified asphalt beginning October 1, 2007.

Port and DuPont

DuPont, a Port tenant, has implemented a new dust control best management practice at its fluorspar unloading and storage facility.

Valero Asphalt

Valero Asphalt has paved its large work yard that is just across Clinton Drive to the southeast of the monitor.

Industrial Facilities

The EPA calculates the total federal consent decree reductions in SO_2 in the upper Texas Gulf Coast to be approximately 33,900 tpy.

- Valero Refining has already implemented control measures to reduce SO_2 emissions by 3,500 tpy.
- The Rhodia sulfuric acid plant to the southwest of Clinton will decrease its emissions by 8,984 tpy from 2005 actual emissions to post-control allowable emissions.
- Scoping modeling calculates a resulting 0.1 to 0.2 $\mu g/m^3$ reduction in sulfate concentrations in the ship channel area from 2006 to the time that all federal consent decree SO_2 reductions are in place, approximately 2013.

EPA's Control of Emissions from Ships

- In March 2010, the Marine Environmental Protection Committee (MEPC) will consider a request to regulate Environmental Control Areas (ECA).
- ECAs would have to comply with more stringent fuel sulfur and engine NO_X limits extending 200 nautical miles around the nation's coastline.
- U.S. applied for ECA designation in March 2009.
- If approved, ships must use 1,000 ppm fuel sulfur by 2015, and new ships must use advanced emission controls by 2016.
- EPA and U.S. Coast Guard will implement and enforce this plan.

Designation Recommendation Considerations

$PM_{2.5}$ Designation Recommendation Considerations

- The area (and state) are currently designated as unclassifiable/attainment.
- The 2006-2008 data from one monitor in the Houston area resulted in a regulatory level above the annual NAAQS.
- These data include periodic and significant particulate contributions that are not controllable by the TCEQ
  - Saharan dust
  - Fires/Dust storms (from Central Mexico, Mexico, and the US).

$PM_{2.5}$ Designation Recommendation Considerations (cont.)

- With exceptional events removed, 2006-2008 data at the Clinton Drive monitor (14.6 µg/m^3) is below the NAAQS.
- Proactive efforts by TCEQ and other stakeholders have resulted in local particulate matter reductions and continue to make local improvements.
- The 2009 data thus far indicate the continued trend in lower $PM_{2.5}$ values at Clinton Drive.
  - Even without excluding any exceptional event days, the $PM_{2.5}$ annual average (January – June) for 2009 is 12.8 µg/m^3
  - The projected 2007-2009 design value (using historical estimates for July – December) is 14.4 µg/m^3.
  - The 2009 Clinton data are expected to be available in early February 2009.

$PM_{2.5}$ Designation Recommendation Considerations (cont.)

- The most recent data available would not suggest that redesignation of Harris County in general or the Clinton Drive monitor is warranted based on the 2006-2008 data with exceptional events excluded, current data trends, and on 2009 data thus far collected.
- Resources and efforts can continue to focus on reducing the local particulate emissions to comply with the current and forthcoming federal standards rather than shifting focus to the revision of the State Implementation Plan process.


Comments/Questions

Comments

Informal comments closed on November 23, 2009, and were sent to:

- e-mail, PUBCOMMENT-AQD@tceq.state.tx.us
- regular mail or e-mail

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